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ABSTRACT

This document is the second in a series of 12 early childhood program descriptions compiled by the Far West Laboratory for Educational Research and Development. The program described here is the Behavior Analysis Model developed by Don Bushell at the University of Kansas in Lawrence, Kansas. The program, designed for children from preschool through third grade, is aimed at preventing academic failure in later grades by teaching the skills necessary for school success at an early age. The program diagnoses each child's level of functioning, determines terminal behavioral objectives for each child, and uses a token economy to bring each child from where he is to where he should be. Included in the program description are brief outlines of: (1) goals and objectives, (2) content and materials, (3) classroom activities, (4) parent involvement, (5) professional and paraprofessional training, (6) administrative requirements and costs, (7) program development and evaluation, and (8) program history and present (1971) status. (JMB)

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Early Childhood
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Program Report

THE BEHAVIOR ANALYSIS MODEL

Project Director: Don Bushell, Jr.

Follow Through
Department of Human Development
University of Kansas
Lawrence, Kansas 66044

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Summary

The Behavior Analysis Model, developed by Don Bushell at the University of Kansas, Lawrence, Kansas, is an early education program for children from preschool through the third grade.

Bushell feels that failure in later grades can be averted by teaching children at an early age those skills and behaviors that are required to succeed in school. They include skills in reading, arithmetic, spelling and handwriting and desirable classroom behavior such as completing tasks, paying attention and working independently. To achieve these objectives, the model prescribes a teaching strategy which focuses on measurable behavior or performance of children. The approach is derived from a branch of experimental psychology, known as the Experimental Analysis of Behavior. Essentially, the program diagnoses each child's level of functioning (where he is), determines terminal objectives (where he should be) and proceeds to bring him from where he is to where he should be. The distinctive feature of the program is its use of reinforcement or rewards. Children are rewarded frequently and immediately for small accomplishments. Use of rewards differ from child to child. Free time may be rewarding for one child and a special game for another. Since these rewards cannot be given in the classroom with necessary frequency and immediacy, a substitute token system is used. Tokens are plastic chips which children will earn for good work and desirable behavior. They can be exchanged later in the day for individually chosen rewards.

The program recommends commercially available programmed materials in reading, arithmetic, spelling and handwriting.

The Behavior Analysis approach is an outgrowth of a research discipline. Bushell maintains that direcct application of the approach in a variety of teaching and training situations has been made and that the effectiveness of the approach has been well documented.

GOALS AND OBJECTIVES

For whom is the program designed?

The Behavior Analysis Model is designed for preschool through third grade. As a Head Start and Follow Through model, it is used with children from poor homes, many of them belonging to non-white ethnic and cultural groups. As an approach, however, behavior analysis has been successfully used with students at all grade levels and from widely varied backgrounds. This report is concerned only with the Behavior Analysis approach to Head Start and Follow Through.

What are the goals and objectives of the program?

The objectives of the program are to teach young children social and academic skills which will enable them to compete effectively in the public schools, and to train teachers, aides, and parents to use positive reinforcement to develop these skills.

What is the rationale for program emphasis and design?

The developers feel that the assumption that young children are not ready for formal instruction has no empirical support. They believe that young children can learn and should be taught the necessary skills in order to succeed in school. The strategy adopted to teach these skills is the Behavior Analysis approach, which the developers feel has demonstrated its effectiveness in the laboratory and through direct application in classrooms. (See Classroom Activities for a description of this teaching strategy.)

CONTENT AND MATERIALS

How is the program to be used?

For Follow Through and Head Start purposes, the program is designed for use as a complete nine-month, pre-kindergarten through third grade program. The curriculum consists primarily of commercially available materials.

What skills, concepts, and attitudes are to be learned?

Within the broad areas of social and academic skills, the program focuses on skills in reading, mathematics, spelling, and handwriting, and a wide range of social skills such as cooperation with peers and adults, decision making, independence and self-confidence.

How is the curriculum organized?

The curriculum is built around programmed materials that:

1. specify the behavior the child will be capable of at the end of the sequence,
2. require frequent responding by the child,
3. contain clear criteria for a "correct" response,
4. allow for individual rates of progress, and
5. provide for periodic testing of achievement gains.

What student materials are provided or suggested?

The developers recommend programmed materials because they best meet the five criteria above. Specific

materials recommended for kindergarten and first grade in the areas of reading, writing, arithmetic, and spelling are:

Reading: *Behavior Analysis Phonics Primer*, published by the developers; Buchanan and Sullivan Associates *Programmed Reading*, McGraw-Hill; *SRA Reading Laboratory*, Science Research Associates. These materials are to be used in the order listed.

Writing: *Behavior Analysis Handwriting Primer*, published by the developers; then *Handwriting With Write and See*, by Skinner and Krarower, published by Lyons and Carnahan.

Arithmetic: *Sets and Numbers* (Grades K-6) by Suppes, published by Singer Co.

Spelling: *Spelling and Writing Patterns*, by Botel, Holsclaw, Cammarota, and Brothers, published by Follette Educational Corp.

What materials are provided or suggested for the teacher?

The following materials are provided for the teacher:

1. An 18-minute color film entitled *Behavior Analysis Classroom*. The film discusses the organization of the Behavior Analysis classroom. It is available through the Bureau of Visual Instruction, University of Kansas, Lawrence, Kansas 66044.

2. An 8-minute color film entitled *Teaching with Tokens*. The film discusses the use of tokens to reinforce behavior in the classroom. It is available through the Bureau of Visual Instruction, University of Kansas, Lawrence, Kansas 66044.

3. A program booklet entitled *The Behavior Analysis Classroom*. It is available from the developers at the Department of Human Development, University of Kansas, Lawrence, Kansas 66044. This booklet gives a brief description of the program and provides references to other resource material.

4. *A Token Manual for Behavior Analysis Classroom.* It is available from the developers at the Department of Human Development, University of Kansas, Lawrence, Kansas 66044.

What materials are provided or suggested for student evaluation?

The following student testing materials are suggested:

1. The Behavior Analysis Entry Behavior Inventory. This is an audiovisual inventory of entering verbal and nonverbal behavior. It requires the use of a machine and cards available from Electronic Futures, Inc. (See Classroom Activities for more details about this inventory.)

2. "Progress Achievement Test." This test was designed by the developers and based on the Buchanan-Sullivan Programmed Reading materials. (See "How are students evaluated?")

3. Curriculum-embedded tests in the areas of reading, math, spelling, and writing.

CLASSROOM ACTIVITIES

What is the teaching/learning strategy?

The Behavior Analysis approach focuses on the systematic development of social and academic skills. A simplified statement of the steps involved follows.

Establishment of terminal behavior. The first task is "to define in precise terms the behavior which a student must be able to display at the completion of each grade level." This behavior, called terminal behavior, is specified in the areas of reading, writing, spelling, arithmetic, and social skills. Determination of terminal behavior marks the end point of the continuum along which learning is to occur.

Establishment of entry behavior. The second task is to determine in precise terms the skills each student already possesses when he enters the program. This establishes the beginning point on the continuum of each skill area.

Establishment of a system of classroom management. Having established the beginning and ending points of the continuum along which development is to occur in each skill area, it remains to establish an instructional strategy to bring each student from where he is to where he should be. The strategy involves the use of effective reinforcement procedures. Activities which are preferred (chosen most often) by students are used as reinforcers. Such activities may include free time, attention of the teacher, diet supplements, or opportunity to work with preferred materials. These activities can maintain a high level of motivation if they are properly related to performance. Reinforcers are most effective when they are presented immediately following the desired behavior, but in the classroom reinforcing activities such as those described above are difficult to deliver immediately. For this reason, a token reinforcement system is used whereby desired behaviors are reinforced immediately with the use of tokens (plastic chips). When a child faces a new and difficult task, tokens are given for small amounts of progress. Later, when he is close to mastery of the task, fewer tokens are necessary to maintain progress. The student may accumulate tokens and decide when and for what to exchange them. Each activity has a cost. For example, a recess activity might cost 20 tokens, a story, 15. The content and prices of the activities are changed often in order to maintain the interest and enthusiasm of the children.

What classroom organization is best suited to this program?

The developers recommend that each Follow Through class of 25 to 30 children be staffed with a lead teacher who is generally in charge of the class and specifically responsible for reading instruction, a full-time teaching aide responsible for small-group math instruction, and two parent aides who concentrate on handwriting, spelling, and individual tutoring lessons. This kind of team arrangement ensures that each child receives frequent personal attention. During the early years almost all of the instruction is conducted in small groups of five or six, or individually. Early instructional periods are short (10 minutes for three-year-olds). The instructional periods are followed by activity periods during which the students exchange the tokens they have earned. This pattern is repeated throughout the school day. However, as the year progresses, there is more instructional time per activity period. It is not uncommon to find that at the end of the year, 45-50 minutes of instruction is supported by 10-15 minutes of activities.

How are students evaluated?

Students are continually tested to monitor progress. The following procedures are used for student evaluation:

1. The Behavior Analysis Entry Behavior Inventory is used to determine the skills each child already possesses when he enters the program. The Entry Behavior Inventory consists of 91 tasks represented on EFI cards. An EFI card, like a Language Master card by Bell and Howell, is a blank card with an attached audio tape. During the inventory session, the EFI card is placed in an EFI machine, and the audio instructs the student to complete a particular task on the card. For example, card 56 shows an arrow and the audio instruction is "Show me the way the arrow goes." The entire inventory tapes the child's knowledge of parts of the body, color, shapes, numbers, relational concepts, rhyming, and general information.

2. A Weekly Individual Progress Report is used to monitor student progress in the areas of reading, writing, spelling, and arithmetic. The report consists of a chart on which the teacher marks the workbook page each child has reached at the end of the week.

3. A Progress Achievement Test, designed by the developers and based on the Buchanan-Sullivan Programmed Reading materials, is used to monitor progress in reading. The test consists of 17 short test forms.

4. Curriculum-embedded tests in reading, math, writing and spelling are also used. These are tests included with the recommended programmed materials.

What is a representative lesson?

A typical lesson is conducted with a small group of four to six children seated around a table. Typically, the instructional materials are programmed and students have their own workbooks or work sheets. The role of the teacher is to direct the children's work and to reinforce progress. Desirable behavior such as following instructions, completing tasks, and attending are immediately and frequently followed by tokens. The tokens are always accompanied by descriptive praise like, "That's a very good sentence, Vincent."

PARENT INVOLVEMENT

To what extent are parents involved?

Head Start and Follow Through parents may serve as parent aides in the classroom. There are two parent aides and one full-time teacher aide (who may or may not be a parent) in each classroom.

A parent is first hired as a trainee for six to eight weeks. During that time, he learns to tutor students first individually, then in small groups of two or three. After training, some parents are employed as aides for an entire semester. Some of the semester aides are employed to fill full-time positions as teacher aides.

As in all Head Start and Follow Through classes, parents participate in the local Policy Advisory Committee. A parent coordinator organizes the program, recruits parents, and coordinates parent participation.

What materials are provided for training parents?

Texts and manuals used in parent training programs include:

A Parent Training Manual for Behavior Analysis Classrooms, available from the developers.

Living with Children, 1968, by Patterson and Gullion, published by Research Press.

Parents Are Teachers, 1970, by W. C. Becker, published by Research Press.

Parents/Children/Discipline: A Positive Approach, 1971, by C. Madsen, published by Allyn and Bacon, Inc.

The materials listed below can also be used for training parents.

A Token Manual for Behavior Analysis Classrooms, available from the developers at the Department of Human Development, University of Kansas, Lawrence, Kansas 66044.

An 8-minute color film entitled *Teaching with Tokens*, available through the Bureau of Visual Instruction, University of Kansas, Lawrence, Kansas 66044.

(See Professional and Paraprofessional Training for information about preservice training for parents employed to teach in the classroom.)

PROFESSIONAL AND PARAPROFESSIONAL TRAINING

What skills or knowledge do teachers require?

Teachers and teacher aides must be able to teach in the manner required in a Behavior Analysis classroom. For example, they should be able to dispense tokens correctly and use prescribed verbal techniques. They should know how to manage the classroom, do team planning, conduct activity periods, prescribe lessons for tutoring sessions, and solve behavior problems. They should also be familiar with daily and weekly recording procedures.

Are training programs available for professionals and paraprofessionals?

Since the beginning of the 1970-71 school year the developers have operated two Regional Training Centers for Behavior Analysis teachers, one in Lawrence, Kansas, and the other in Philadelphia, Pennsylvania. These centers provide year-round individualized training for teachers and aides. There are three phases of training.

Phase I. Trainees are coached by their local staff training coordinator in (a) the descriptive literature on the Behavior Analysis model, (b) the basic research literature of applied behavior analysis, and (c) the teacher's manuals for the curriculum materials of the Behavior Analysis model.

Phase II. After demonstrating competence in the Phase I materials, the trainee may enroll for a five-day practicum course at the nearest Regional Training Center. While working with children in this ongoing program, each trainee is coached in the skills of (a) individual tutoring, (b) small-group teaching, (c) measurement and recording procedures, (d) curriculum procedures, (e) staff planning, and (f) special procedures such as the operation of videotape equipment. Each teaching skill has an explicit terminal performance criterion which allows every trainee to keep track of his or her own progress in every area.

Phase III. At the conclusion of the practicum week, each trainee has a specified time (normally one month) to demonstrate mastery of all Behavior Analysis procedures in the normal conduct of his or her own classroom. The third phase, like the first, is monitored and supported by the local staff training coordinator. The criterion performance of all Phase III requirements results in certification as a Behavior Analysis Specialist (Elementary Grades).

Parent Training. Parents who are employed to teach in the classroom receive five days of training prior to their term of service. These training sessions are conducted under the supervision of the local parent training coordinator, who also provides continuing support and inservice training for parents. Parent training gives special emphasis to the appropriate use of reinforcement and to the procedures for teaching handwriting and spelling.

Administrators' Workshops. Special workshops for principals and other administrators are conducted each year at Regional Training Centers. These workshops bring administrators up to date on the latest Behavior Analysis classroom procedures and training programs.

Professional Degrees. Advanced professional training in Behavior Analysis is provided by the Department of Human Development, University of Kansas, which offers the M.A. in Human Development and the Ph.D. in Developmental Psychology. Admissions and program information on these programs is available from the developers.

What materials are available for professional and paraprofessional training?

Materials for training teachers and teacher aides are available from the developers. These materials include two color films, entitled *Behavior Analysis Classroom* and *Teaching with Tokens,* a program booklet entitled *The Behavior Analysis Classroom,* and a manual entitled *A Token Manual for Behavior Analysis Classrooms.* (See Content and Materials.)

ADMINISTRATIVE REQUIREMENTS AND COST

What facilities and physical arrangements are needed or recommended?

Since most of the instruction is conducted individually or in small groups, arrangements of classrooms and facilities should reflect this requirement of the program. The classroom should be arranged with a number of worktables large enough to accommodate a group of four or five children each. No special facilities are required other than the normal amount of furniture, storage space, and equipment generally found in a classroom.

What special equipment is needed or recommended?

To assess entry behavior of children, an EFI recorder and EFI cards are required at the kindergarten level. The EFI equipment is manufactured by Electronic Futures, Inc., New Haven, Connecticut 06473, and its estimated retail price is $270 plus accessories.

A videotape recorder, camera, and monitor for 1/2-inch tapes is recommended for evaluating small group lessons. A number of manufacturers have videotape equipment on the market. The Sony videotape recorder system, which retails from about $1,200, is most commonly used.

What professional and paraprofessional personnel are needed or recommended?

For every class of 25 to 30 children, there is one lead teacher who heads the instructional team and takes special responsibility for reading instruction, one full-time teacher aide responsible for small math groups, and two parent aides who concentrate on handwriting, spelling, and individual tutoring. This makes an instructional team of 4 adults for every 25 to 30 children.

Follow Through projects also provide a staff training coordinator for every 10 Behavior Analysis classes. The staff trainer is responsible for inservice support and monitoring of classroom teams and serves as primary liaison with the developers at the University of Kansas. The other support person is that of parent coordinator/

trainer. The parent coordinator is usually a parent selected by the Policy Advisory Committee to introduce the program to the community, to recruit parents to work in the classroom, and to provide necessary pre- and inservice training for parents.

As each local program becomes more firmly established (usually after three years), the local staff assumes full responsibility for program implementation with only occasional consultation with the developers.

What does it cost to implement the program?

Estimated costs *above* normal maintenance costs of districts include the following:

Materials:	$20 per child in kindergarten; none at other grade levels
Equipment:	$500 per class (optional)
Teacher's salary:	None
Aide's salary:	One per class
Parent aide:	Two per class
Training:	For lead teacher and teacher aide at the Training Centers = $100 per trainee
Consultants:	From the University of Kansas; may be negotiated individually with each school district

Are the curriculum materials available?

All curriculum materials recommended by the developers are available through designated publishers. (See Content and Materials.)

PROGRAM DEVELOPMENT AND EVALUATION

What is the research base for the program?

Behavior Analysis is an applied extension of the branch of experimental psychology known as the "Experimental Analysis of Behavior." Generated by the works of B. F. Skinner and his colleagues, the Experimental Analysis of Behavior has built a large body of research which, since 1964, has been presented through the Journal of the Experimental Analysis of Behavior.

More recently (1968), the Journal of Applied Behavior Analysis has been the vehicle for presentation of research in the analysis of "socially relevant" human behavior. The bibliography at the end of this report contains a sample of the materials available which describe the theoretical background and research accomplishments of behavior analysis.

How was the program developed and tested?

Various elements of the program have been developed and analyzed in universities, regional laboratories, and private research settings throughout the country during the past 25 years. Much of this research and development has been supported by grants from the U.S. Office of Education, the National Institute of Mental Health, and the Office of Economic Opportunity.

What evaluation studies have been conducted?

Because behavior analysis is the outgrowth of a research discipline, there are hundreds of published studies which document the effects of applied behavior analysis. The bibliography at the end of this report and the Journal of Applied Analysis describe the accumulating evidence on the effects of classroom behavior analysis procedures. None of these investigations, however, describe the long-term effects of systematic behavior analysis programs for thousands of poor children in neighborhood schools that reflect a variety of cultural and ethnic settings--that is, what the Follow Through program is designed to do.

As with all Follow Through models, the longitudinal effects of Behavior Analysis projects are being systematically evaluated by Stanford Research Institute. Concurrently, evaluations of a more limited scope are being conducted by research teams at Columbia, Northwestern, and the University of Florida; by the developers; and by several school districts that are implementing Follow Through projects. The results of these investigations are scheduled for national dissemination by the U.S. Office of Education (DCE) in a series of annual reports beginning in February 1972.

PROGRAM HISTORY AND PRESENT STATUS

What is the history of the program?

Behavior analysis has developed out of the basic experimental procedures first developed in the laboratory by E. L. Thorndike and later by B. F. Skinner and his associates. Experiments employing behavior analysis were extended outside the psychologist's laboratory to socially significant problems only at the end of World War II, and in the 1960's research results began to find application in educational and therapeutic situations.

Among the early contributors to the development of the educational applications of behavior analysis, Don Baer, Sidney Bijou, and Montrose Wolf are particularly notable for their pioneering work with young children at the University of Washington. Throughout the past decade, important contributions have been made to the field by Wesley C. Becker and his associates at the University of Illinois; Theodoro Ayllon and Nate Azrin at Anna State Hospital, Illinois; Roger Ulrich at Western Michigan University; Daniel K. O'Leary at the State University of New York, and Charles Madsen at Florida State University.

The applications of behavior analysis are now reported by some dozen journals, and its proponents are represented not only in departments of psychology but in schools of applied education as well. In the spring of 1968, *The Journal of Applied Behavior Analysis* began regular publication with editorial offices located at the University of Kansas.

Dr. Don Bushell, Jr., the director of the Behavior Analysis Follow Through Program, began employing the techniques of classroom behavior analysis at Webster College in St. Louis in 1965. In 1966 the Webster College project was supported in part by the Central Midwestern Regional Laboratory (CEMREL). In 1967 Dr. Bushell joined the faculty at the University of Kansas and became co-director, with R. Vance Hall, of the Juniper Gardens Parent Cooperative Preschool. Research there provided the foundation for the parent component of the Behavior Analysis Program when the Follow Through project began in 1968. The program is currently located at the University of Kansas, Department of Human Development, Lawrence, Kansas 66044.

What is the present status of the program?

At the present time, the Behavior Analysis model is implemented in both Head Start and Follow Through classes. Three Head Start communities use the model in 18 classes with about 320 children. In Follow Through, 12 school districts are implementing the model in 200 classes with about 5,000 children.

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